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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/838,810	04/20/2001	Paul F. Struhsaker	WEST14-00005	2942

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09/12/2005

Docket Clerk  
P.O. Drawer 80089  
Dallas, TX 75380

EXAMINER

FILE, ERIN M

ART UNIT PAPER NUMBER

2634

DATE MAILED: 09/12/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/838,810

Applicant(s)

STRUHSAKER ET AL.

Examiner

Erin M. File

Art Unit

2634

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 06 June 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5, 7-14 and 16-18 is/are rejected.
- 7) ☒ Claim(s) 6 and 15 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 April 2001 is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1, 5, 10, and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Genossar et al. in view of Fuhrmann et al.

Claims 1, 10, Genossar discloses a receiver front-end capable of receiving data burst transmissions from said plurality of subscriber transceivers in an uplink portion of a TDD channel, wherein said receiver front-end demodulates said received data burst transmissions into a digital baseband signal in-phase (I) signal and a digital baseband quadrature (Q) signal (fig. 1, 2, col. 1, lines 15-36).

Genossar et al describes the use of a decision feedback equalizer (col. 10, line 63-col. 11, line 6) and shows one in fig 2 item 54, but does not specifically state the use of the feed-forward, feed-back, adder, and slicer components typically found in such a equalizer. He also fails to teach the use of a FFT. However, Fuhrmann discloses a first

Art Unit: 2634

frequency domain feedforward equalization filter capable of receiving said I signal and performing a Fast Fourier Transform on a block of N symbols in said I signal to produce a first symbol estimate sequence (fig. 37, col. 114, lines 19-34). A second frequency domain feedforward equalization filter capable of receiving said Q signal and performing a Fast Fourier Transform on a block of N symbols in said Q signal to produce a second symbol estimate sequence (fig. 37, col. 114, lines 19-34). An adder capable of receiving said first signal estimate sequence on a first input and said second signal estimate sequence on a second input and producing a combined symbol estimate sequence (fig. 37, 925). A slicer capable of receiving and quantizing said combined symbol estimate sequence to produce a sequence of decided symbols (col. 85, line 21 – col. 86, line 50). A time domain feedback filter capable of receiving said sequence of decided symbols and generating a symbol correction sequence that is applied to a third input of said adder (fig. 37, 925, col. 85, line 21 – col. 86, line 50). The limitation of using the receiver in a basestation is met by Genossar et al in figure 1. Moreover, regarding the use of two feed-forward equalizers and a third input is implied by Genossar et al since he shows that his receiver demodulates the incoming RF signal into I and Q components and THEN equalizes them using item 54, which he states could be a DFE. It would have been obvious to those skilled in the art at the time the invention was made for Genossar et al's DFE to have the components stated by Fuhrmann et al. The motivation to combine is that a feed-forward equalizer, feedback equalizer, adder, and slicer are the well-known essential building blocks of a DFE. The

Art Unit: 2634

use of a FFF is admitted prior art by the applicant in figure 38 and is a well known component of a OFDM receiver.

**Claims 5, 14**, inherit the limitations of Claims 4, 13, respectively. Genossar and Fuhrmann meet all the limitations of the Claim except describing the exact structure. However, the number of tap delays and tap coefficients used in the feedback filter is a design choice since it is dependent upon the channel characteristics and receiver performance criteria. Further, it is commonly known in the art that regardless of the design parameters, the number of more information sources (in this case delay taps) must always be greater than the number of coefficients solved or determined from the information sources, making the value of delay taps  $D$ , always greater than the number of coefficients of the equalizer,  $C$ .

3. Claims 2, 3, 11, and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Genossar et al. in view of Fuhrmann et al. in further view of Wang.

**Claims 2, 3, 11, 12**, inherit the limitations of Claims 1, 2, 10, 11, respectively. Neither Genossar nor Fuhrmann disclose a frequency domain feedforward equalization filter is  $2/T$  fractionally spaced, where  $T$  is a period of said block of said  $N$  symbols. However, Wang discloses such a filter with  $2/T$  fractional spacing (col. 10, line 66 – col. 11, line 31). By using  $2/T$  spacing in the equalization filter the Nyquist criterion for sampling is met. Because the Nyquist criterion is well known in the art it would be obvious at the

Art Unit: 2634

time of invention to incorporate the  $2/T$  fractionally spaced filter of Wang into the combined invention of Genossar and Furhmann.

4. Claims 4 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Genossar et al. in view of Fuhrmann et al. in further view of Juntti.

**Claims 4, 13**, inherit the limitations of Claims 1, 10, respectively. Genossar and Fuhrmann meet all the limitations of the Claims except describing the feedback filter having delay taps. However, Juntti discloses in figure 2 that his decision feedback equalizer has a delay line. Because it is well known in the art that a fundamental component of a filter/equalizer are delay taps, it would be obvious for Genossar et al, Fuhrmann et al, and Juntti to be combined.

5. Claims 7, 8, 16, and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Genossar et al. in view of Fuhrmann et al. and in further view of Webster et al.

**Claims 7, 16**, inherit the limitations of Claims 1, 10, respectively. Although disclosed by neither Genossar nor Fuhrmann, Webster discloses a channel estimation circuit capable of detecting a preamble sequence of symbols in at least one of said in-phase and quadrature signals and producing a first plurality of feedforward coefficients usable by said first frequency domain feedforward equalization filter (fig. 1, col. 2, lines 20-42).

Art Unit: 2634

Webster further discloses that using this preamble sequence results in rapid channel estimation (col. 1, lines 6-15), therefore it would be obvious to one skilled in the art at the time of invention to combine Webster with Genossar and Fuhrmann.

**Claims 8, 17**, inherit the limitations of Claims 7, 16, respectively, Although disclosed by neither Genossar nor Fuhrmann, Webster discloses a channel estimation circuit producing a second plurality of feedforward coefficients usable by said first frequency domain feedforward equalization filter (fig. 1, col. 2, lines 20-42).

6. Claims 9 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Genossar et al. in view of Fuhrmann et al. and in further view of Quigley et al.

**Claims 9, 18**, inherit the limitations of Claims 1, 10, respectively. Both Genossar and Fuhrmann fail to disclose the use of a block size of 16, however, Quigley discloses the use of a block size of 16 symbols. Block size is a design choice. It would be obvious to one skilled in the art at the time of invention to incorporate Quigley block size of 16 into the combined invention Genossar and Fuhrmann.

***Allowable Subject Matter***

7. Claims 6, 15 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

***Conclusion***

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Erin M. File whose telephone number is (571)272-6040.



Art Unit: 2634


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Chin can be reached on (571)272-3056. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Erin M. File

EF

8/29/2005

  
**STEPHEN CHIN**  
**SUPERVISORY PATENT EXAMINE**  
**TECHNOLOGY CENTER 2600**